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THE BREEDING HABITS OF THE FLORIDA BURROWING OWL (*SPEOTILO* *CUNICULARIA FLORIDANA*).

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SO LITTLE relating to the habits of this race has been made known that I am induced to offer the following observations made during a recent visit to southern Florida. I arrived, April 24, 1891, at Fort Myers near the mouth of the Caloosahatchie River, and, engaging a small boat with guide, proceeded up the river, intending to penetrate the interior as far as Lake Okeechobee. After three days' exhausting work with sail, oar and pole, we reached 'Coffee Mill Hammock', a tiny grove of palmettoes on the north bank of the canal connecting Lake Hicpoochee with Lake Flirt. At this point I spent a day collecting birds, and in the course of my rambles chanced to meet a 'cracker' who was looking after some stock in the neighborhood and who said that he could take me to a place where there were "plenty of ground Owls." The next morning, having dismissed my former guide, I started across country with 'Jack.' We had a two-horse open wagon, a barrel of corn, can of provisions, and my baggage, in all making with ourselves a fair load for the little scrub ponies to drag across the twenty miles of prairie stretching between us and Nicodemus Slough, where, Jack assured me, there

were more Owls than I could carry away. We struck into and through the pines and live oaks, which here reach near the upper waters of the lake, in a northeasterly direction and emerging upon the prairie five miles beyond, took a direct easterly course across it.

The elevation of the land in Florida south of Lake Okeechobee is not more than twenty-eight feet above the Gulf of Mexico, that is, the average between high and low lands is at about the level of Lake Okeechobee* in the rainy season. Four feet above this level and higher grow the pines, within three feet of it flourish live oaks, within two feet of it grows the cabbage palmetto, and within a foot of it the saw palmetto. The true prairie region in this neighborhood comprises a vast extent of country whose elevation is less than a foot above the high water mark of Lake Okeechobee. At widely distant intervals in this plain occur circular mounds varying in extent from plots twenty feet in diameter to those of several acres, which are evidently composed of sand blown up by the winds of summer. Upon these, according as they range one, two or three feet above their surroundings we find dense clumps of saw palmetto, cabbage palmetto, or live oak hammocks. Those hammocks which are three feet high, contain all three species arranged symmetrically, the dwarf palmettoes forming the border, the cabbage palms coming next and mingling with the live oaks which crowd the centre. The prairie proper is thickly clad with short grass, indicating considerable fertility in the soil, and upon this subsist immense herds of half-wild cattle and hogs, and numerous deer. By the first of May the greater part of this area is three feet above the water level, and one may travel for miles without finding anything in the numberless dry lakes and water holes that is fit to drink, until he reaches some slough that communicates by a depressed channel with the main lake. Despite the greenness of this grassy wilderness the northern traveller who looks abroad over it, is involuntarily reminded of a desert—a sort of Sahara in miniature. The heat on his back, the dancing reflections of the semi-tropic atmosphere, the distant groups of tall palmettoes rising sheer from the plain, all conspire to impress him with the wonderful resemblance.

*Twenty feet.

Across this desert we proceeded, winding among the intervening clumps of scrub palmetto, bumping over their half-buried roots where it became necessary to make a short cut, until we entered a sloping piece of ground a mile or so wide, from which the water had but lately evaporated and which was evidently the site of a large, shallow pond. Traveling here was comparatively easy, and here Jack reported having seen Owls a few days previously. We had nearly reached the borders of this pond when my companion pointed to an indistinct spot near a low clump of palmettoes, saying with perfect confidence that it was an Owl. At that moment the animal, for so it proved, vanished, and in a few seconds reappeared on a low, sandy hillock a few feet from its former position and, bowing profoundly in opposite directions, sailed off a few rods to another mound where it continued to bow in the most ludicrous and deferential manner. Simultaneously another Owl appeared on the original hillock. Dismounting from the wagon, Jack whispered a few instructions, and each man approached his bird. I was too much entertained with the antics of mine to think of shooting it till the report of my companion's gun frightened both of us sufficiently to render my snap shot ineffectual; but after a short flight the bird alighted behind a clump of palmetto and was secured.

Jack having secured the male, we examined mound number one and found that the female had been surprised in the act of digging her burrow, over which the male had acted sentinel, and from which, after entering and giving her notice, he had reappeared in the manner described. The cavity was barely a foot deep and two feet long, dug in the wet sand near the margin of the pond and not ten feet from the palmetto bushes. Near it was the ruin of a former burrow from which Jack had procured eggs ten days previously.

Mound number two was then looked after. Its situation was at a lower level than the others, and the depth of the burrow below the surface was correspondingly less, being only three inches. It was about five feet long, and had two openings about midway between which was a cave-in caused by the trampling of cattle. Inserting the hand and giving a quick upward jerk, the thin sod was easily removed without much danger of snake or skunk bites, and when some two feet of the burrow were opened we found an egg. There were no others, indicating that the female had been trapped

during oviposition, had been forced to dig her way out in the opposite direction, and had then abandoned the site for a better one on higher ground where the danger from beast and flood could be avoided. This was evidently the pair Jack had previously robbed, so we see that *Speotyto* is nowise behind others of its family in the persistency with which it attaches itself to a given locality.

No other birds were seen in this place, but a mile farther on we found three more in a precisely similar location. These also had been robbed some days previously but had succeeded in making a new home near the old one, from which we procured four fresh eggs. In this case, as before, the male gave notice of our approach, but instead of showing fear, boldly flew toward us with a threatening chatter, while the female concealed herself among the long grass near the nest. Nicodemus Slough, our destination, was reached about six P.M. It is a low, swampy 'bonnet'-covered estuary reaching from the lower waters of Lake Hippoochee northward across the prairie. It is about eight miles long, and at the place where we crossed it half a mile wide. The dry season had so reduced the flow of water from the surrounding lowlands that we could not detect it on crossing, though a week before the horses had here waded up to their bellies.

At this spot, in a large live oak and palmetto hummock, we spent the weary night amid a memorable chorus of alligators, frogs, Barred Owls and mosquitos. Our start next morning was an early one. Having loaded everything on the wagon and harnessed the horses, I armed myself with gun and hatchet and made my way through the swamp to the opposite side, where I was directed by Jack to walk along and keep a sharp lookout, he at the same time driving the team and hunting along the left bank. In the course of half an hour we had struck — especially on my side of the slough — a continuous colony, three miles long, of breeding Owls. The retreating waters of the adjoining slough had left a margin of flat, grass-grown sand, of varying width, between the swamp and the saw palmettoes, and extending indefinitely in the direction of the stream. This formed the breeding ground of several hundred pairs of Owls, and here in the course of three hours I made a thorough acquaintance with the outdoor and indoor life of a very interesting bird.

The actions of this species upon the near approach of an intru-

der to its nest are interesting and ludicrous in the extreme. If the pair have a full clutch of eggs, one parent is sure to be on the mound or just within the entrance, as often the female as the male. If the former, she makes far less demonstration than the male, and generally slinks away to the long grass, or behind the palmettoes, and peeps at you. If it be the male, he performs the most elaborate tricks, and either comes to meet you or circles about and alights on the level ground near the hole, frequently uttering as he does so a hurried succession of sounds between a chatter and a choke. In either case the sitting bird does not leave the nest, and if dug out will fight to the death though given the chance to escape.

If the birds are nest-building or have not laid a full clutch of eggs both of them are often found on the mound, sometimes, as it were, wing-in-wing (I have seen them bow together), but generally the female takes the traditional 'back seat' and the doughty father demands the countersign and braves the onset alone, while the weaker vessel makes good her retreat. In this case, should there be one in the burrow, the other utters a low half-audible cry which speedily brings its companion above ground.

When the burrow contains young you rarely surprise the adults below ground. Out of ten nests examined which held young of all ages I captured only one adult bird. This is owing to the extreme solicitude of the parents and the voracity of the brood which is always numerous. The anxiety of the old males whose young are being threatened is so great that I have had them strike my cap awry while digging, and in general the conduct of the females in comparison is shameful. On all occasions a wounded bird would make for the nearest hole with all possible speed and could not be dislodged without being dug out.

The utmost harmony prevailed in this widely scattered community. Where four or five pairs were living close together the males would combine their attacks upon me and the females would retire together to some secluded spot and have a talk. On one occasion an over-curious mother flew up from behind a bunch of palmettoes, and alighting thereon took a comical sidelong glance at me, but finding she was perceived returned to the ground. On only one other occasion did I see them alight otherwise than on the ground, although later in the afternoon I noticed

several sitting on a row of fence posts which ran through their domains precisely as *S. c. hypogæa* does in the West. On no occasion did I notice either young or old *sit* in the open air. They always stood upright, even when unconscious of my presence.

Every action of this species bespeaks a bird of eminently diurnal habits, but I have no reason to believe that they cannot range with equal freedom at night. From the nature of their food, however, I conclude they are more active in the daytime. The flight of this Owl, while rarely protracted, is well sustained and graceful. They made long trips to and from the water holes, which were often a mile distant, in search of food for their hungry brood, but on no occasion did I see them fly higher than thirty feet. The voracity of the young is phenomenal. I kept seven, of different ages, in a tin box for several days. Beside eating everything, fresh or putrid, that was offered, they attacked and devoured each other. I was forced to kill the three remaining cannibals to preserve them.

In no instance was there any evidence that the Owls utilized the homes of other animals. At the best, such places are very scarce in this region of Florida, and owing to the friable nature of the soil and the evident facility with which these birds dug for themselves, such a supposition seems unnecessary. With three exceptions all of the twenty burrows I explored were dug in the moist, sandy margin of the slough, from twenty to one hundred feet down the gentle, grassy slope between the thickly fringed palmetto bank and the water's edge. The more recently constructed burrows were invariably nearer the water, owing to the greater ease of digging in the wet sand. In these cases the burrow throughout its entire length would just graze the lower surface of the thin sod, occasionally even penetrating it, causing, in such an event, its abandonment. If not abandoned, one of the myriad roving cattle would be likely soon to set foot on it and break through, or a sudden shower might fill it with water. These unfortunate attempts were evidently those of young or late-paired birds, or those whose earlier housekeeping had been broken up by some prowling snake, raccoon, or prairie skunk, and who found it impossible to build a new dormitory in the dry, higher levels at this season.

The normal plan of architecture was as follows: a straight

descent of from 6 to 18 inches, then a level or slightly descending tunnel *in a northerly direction* from four to seven feet in length, at the end of which, in an oven-shaped pocket, often a foot in diameter and with flat roof, is placed the nest. The most frequent exception to this rule was a burrow starting as above and descending at an angle of 45° for three feet, then turning westwardly and proceeding with a slight inclination two or three feet farther or even rising abruptly to near the surface. In two instances I saved myself half an hour's digging by sounding the surface with a hatchet, and once the trouble of digging at all, by the hissing of the brood under the sod in a burrow that made a sheer pitch the length of my arm toward the antipodes. I mentioned above certain exceptions. These burrows must have been the work of very wise old birds, and from their appearance had been bequeathed from family to family through many generations. They were all found in a little grassy area twenty feet behind the outer edge of the palmettoes. One of them, which I unfortunately attempted to dig out with my hatchet, descended obliquely among the roots of a palmetto bush to a depth of four feet, made a semi-circular sweep of seven feet, and terminated in a nestful of seven half-fledged young, bedded among the thick rootlets. The size and general character of this burrow made me think it might have been the deserted earth of a fox; but an examination of the other two showed such a similarity with it that I am persuaded the Owls had done all this tremendous digging themselves.

Every completed burrow contained a nest for the reception of the eggs, always composed of broken pieces of dry cow droppings and the fragments of sod which had been removed at the commencement of the excavation. As may be imagined, there was no form nor comeliness to this kind of nest, the material being scattered about the rear end of the tunnel without attempted arrangement, and it as often covered the eggs as the reverse. Not a vestige of grass, feathers, or hair was detected in my examination.

On my side of the slough nearly all the nests contained young, the oldest having been hatched a fortnight, while others were not a day old, a great disparity of age being frequently noticed in the same family. Seven was the largest number of young, and six the greatest number of eggs found, the average being a little

above five. Jack's territory had been hunted a few days before and his success in egg collecting was proportionately better, as each disappointed pair had made another home and laid again. It was impossible to determine the length of incubation, but that the male bird undertakes a large share of this task in the daytime we received certain proof.

When the nest contained young, the mound and burrow were strewn with the rejected remains of their food, but, strange to say, there was no evidence that the young or old ejected the pellets so peculiar to rapacious birds. If they had done so we certainly should have found them. Among these remains were detected the legs and elytra of various grasshoppers and coleoptera, skulls of a very small rodent, skulls and backbones of fish, one of which was six inches long, the skins of snakes, the dried body of a lizard, frogs and crayfish, and feathers of four or five species of birds, noticeable among which were those of the Cuban Nighthawk, Bobolink and Savanna Sparrow.

Contrary to the usual experience with Burrowing Owls, I found *S. c. floridana* almost entirely free from vermin. I was forced to carry some of the dead birds in my shirt for lack of room in the satchel, yet I did so without the least annoyance from insects. Jack cautioned me to beware of snakes in the tunnels, but in examining forty the only signs I found of these reptiles consisted of skins and partially eaten fragments that had been carried thither by the birds. I was also told to look out for the small species of skunk inhabiting these regions. Three of the birds shot and two of the tunnels opened had the strong odor of this quadruped, but farther than this the skunks did not materialize.